

# Energy Efficiency in Iowa State Government

## I. The Capitol Complex

**Statutory responsibilities of the DAS Director for managing buildings and grounds related to energy consumption are found in Iowa Code 8A.321:**

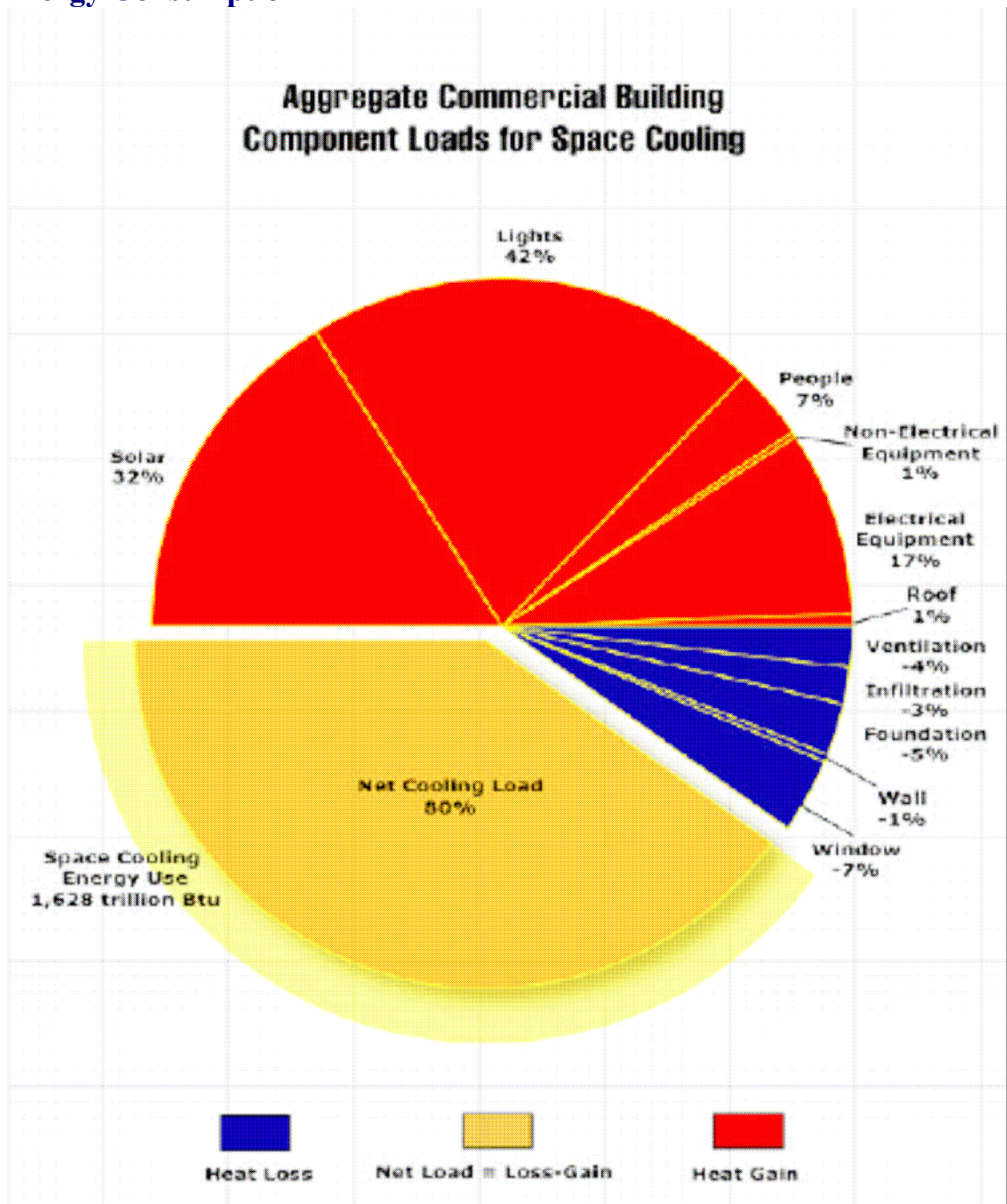
- Pay for utilities for buildings at the seat of government (with the exception of DNR, DOT, DPD and Regents).
  - FY08 budget request for utilities = \$3.8 million.
- Repair, remodel, construct or demolish buildings at the seat of government.
  - New North Office Building
  - IUB/OCA Building
- Maintain all buildings at the seat of government – 1.8 million square feet in 14 buildings on the Capitol Complex; 170 acres of land; 500,000 square feet leased at the seat of government
  - The age of the buildings on the Capitol Complex and at the Ankeny Laboratory facility ranges from the Capitol (1874-1884) to the Wallace Building (1978) to the Ankeny Labs (2005).
- Coordinate leases, location, design and remodel of buildings outside seat of government
- Manage design and construction contracts and let public bids.
  - Currently \$120 million in major maintenance projects are underway
- In conjunction with the Legislative body, remodel, repair and maintain the Capitol.
  - \$80 million in renovations in the last 20 years



*State Historical Society of Iowa. Des Moines*

# Energy Efficiency in Iowa State Government

## II. Energy Consumption



*Graph provided by Substance Architecture*

The purpose of the diagram is to show the 'loads' of a building that require expending energy to satisfy the needs behind the 'load.' This graphic shows that there are two major factors behind the energy use in a building: 1) Energy loads driven by the needs of the building occupants (light, comfort, computers, etc.); and 2) Energy loads driven by systems to address the needs of the building occupants (light fixtures, air conditioning, heating, fans, etc.).

# Energy Efficiency in Iowa State Government

## III. Efforts Today

### 1. New Low-Cost Cooling System

The new cooling system (currently being installed) will manage the utility usage related to winter cooling on the Capitol Complex. It will eliminate the need to operate a chiller during the winter months when temperatures are below 32 degrees Fahrenheit. This saves \$475.00 per day in electricity.

### 2. LEED Certification for New Buildings

- Department of Public Safety Building: DAS is waiting for LEED documentation from the architectural and engineering firm that designed the building renovation. Upon receipt, the information will be included in the application for certification. We anticipate submitting the application by March.
- Iowa Laboratory Facility in Ankeny: LEED certification documentation has been submitted for review. The review process may require several months.

### 3. Life-Cycle Cost Analysis Summary

- Department of Public Safety Building: During the design phase, DAS identified a number of energy conservation strategies. In response, MidAmerican Energy offered an incentive for the implementation of these strategies. As a result of these efforts, the State received a rebate from MidAmerican of \$97,700 and will achieve annual utility savings of \$34,480 from an energy conservation investment that will payback in 4.3 years.
- Iowa Laboratory Facility in Ankeny: During the design phase, DAS identified a number of energy conservation strategies. In response, MidAmerican Energy offered an incentive for the implementation of these strategies. As a result of these efforts, the State received a rebate from MidAmerican of \$451,500 and will achieve average annual utility savings of \$62,593.

### 4. Cold Cathode Compact Fluorescent (CFL) Lighting

We have replaced 1,200 incandescent light bulbs in the Capitol Building with new Cold Cathode Compact Fluorescents. The analysis on the Capitol Building's (Dome, House and Senate Chambers) lighting upgrade project – including the lifetime energy saving, cost savings, and CO2 emission savings – are detailed below for 1,200 bulbs:

Annual Energy Savings (kWh)	98,332 kWh
Lifetime Energy Savings (kWh)	516,000 kWh
Lifetime Cost Savings (\$)	\$30,152
Annual CO2 Savings (LBS)	159,296 lbs
Lifetime CO2 Savings (LBS)	835,920 lbs

# Energy Efficiency in Iowa State Government

Old incandescent bulb cost (each)	.49 cents
New CFL bulb cost, each (after MidAmerican incentives)	\$6.85

Also, this project has requested and may receive an additional MidAmerican Energy incentive of \$4,668, or \$3.89 savings per bulb.

It is important to note that the lifetime of the project, which is based on the rated run hours of the new CFLs and the reported run hours of the lamps, is 5.2 years. All lifetime savings values are calculated based on that lifetime. The payback on this project is estimated to be 1.88 years. DAS plans to continue replacing less efficient lighting where possible.

## 5. Development of a new Energy Management Program for the Capitol Complex and Ankeny Lab Facilities

- MidAmerican Energy, in partnership with Nexant Engineering, is currently performing a comprehensive energy audit of the entire Complex that will be completed in approximately two months.
- This audit is being conducted as a free service to the State by MidAmerican Energy. The Capitol Complex has received a 3-star energy rating (out of 5), which is the highest pre-audit energy rating any governmental or private sector entity has received.
- This was the first comprehensive energy management analysis conducted for state government. The consultant indicated that no other entity reviewed had scored as highly as DAS on its initial assessment.
- DAS was rated at the 3-star/silver level, which indicates that DAS has built a commendable energy management program that is being strategically integrated with other key parts of the state government enterprise. DAS was applauded for this effort because less than 10 percent of audited companies worldwide have achieved this level of performance. DAS is only 6 percent below achieving the 4-star/gold level
- In addition to the star classification, the database utilizes a metric called the International Benchmark Rating (IBR) to more precisely calculate a position within the star system. The IBR for DAS was 2.75, which is at the upper end of the 3-star range (which runs from 2.00 to 2.99), and is well above the industry average of 1.25.
- DAS also scored above the industry average for 17 of the 22 elements that make up the strategic energy management framework and reached the gold or platinum level for 18 elements.
- Usage and score data indicated that DAS could achieve an annual savings in the range of 10 percent to 13% percent (\$270,000 to \$380,000) if it incorporated all best practice energy management practices throughout its operations. The cost to incorporate these practices is under review.



# Energy Efficiency in Iowa State Government

## IV. Future Efforts

### 1. Recommended Actions for Energy Management on the Capitol Complex (from Nexant audit):

- Understanding of performance and opportunities
  - Conduct a baseline study ("energy audit") to establish energy consumption by major users and opportunities for savings.
- Demonstrated corporate commitment
  - Ensure that energy management is a regular agenda item at executive-level meetings. Report on energy management activities and progress made towards goals contained in the organizations energy directive/policy.
- Accountabilities
  - Assign accountability for energy management directly to end users and utilize facility engineers to support end users in improving energy performance.
  - Establish an energy committee to help coordinate energy management activities.
- Awareness and training
  - Conduct basic energy-awareness activities within your organization, focusing on cost savings and environmental issues associated with energy use. Disseminate the information using tools such as the organization web site or newsletter.
- Metering and monitoring
  - Regularly monitor the energy use of all major facilities/cost centers/energy-intensive end users.

### 2. Renewable Resources under Consideration on the Capitol Complex

- Geothermal Systems for new office buildings
- Wind Generation (turbines)
- Use of bio-fuels, such as pure soy oils (boilers)
- Light Harvesting

### 3. Alternative Energy Improvements

Governor Culver has recommended \$200,000 for alternative energy improvements ranging from conversion to bio-diesel fuels to wind generation. These improvements will help to ensure that on average at least 10% of the electric consumption for all buildings where the state directly pays for the electric consumption come from alternate energy production, as defined by Iowa Code Section 476.42, by 2010 and as proposed in Executive Order 41. Currently, the Capitol Complex is purchasing 4.7% green power from MidAmerican Energy. To reach the 10% goal, additional alternatives will be required.

### 4. Energy Savings through Major Maintenance Projects

As part of the major maintenance appropriations or specific capital appropriations for use on infrastructure projects at agencies around the state, a number of energy saving measures are being incorporated into the work, including the following:

# Energy Efficiency in Iowa State Government

- Recalibration of boilers that are not operating properly. The correctly adjusted fuel and air intakes increase boiler efficiency and reduce fuel use.
- Replacement of old toilets with ADA compliant toilets that are low water flow.
- Replacement of conventional faucets with automatic faucets that use less water.
- Replacement of single pane windows in restrooms with glass block. This window upgrade results in natural day lighting, reducing the need for lights in the daytime.
- Replacement of individual window AC units, leaky steam pipes, and oversized one stage boilers with a geothermal system.
- Replacement of old windows with energy efficient windows.
- Installation of energy recovery units in place of make-up air units, resulting in a 20% energy savings from the alternative.
- Replacement of hot water circulation pumps with a lower flow pumps. These pumps use less energy and the lower flow rate does not wear out the inside of the pipes.
- Upgrading electrical distribution systems at State institutions. This includes Power Logic metering at each building main distribution panel. These meters are connected to the building automation system, giving a facility the ability to better monitor and control utility usage.
- Installation of energy efficient lighting to upgrade current outside lighting and reduce energy consumption.
- Installation of occupancy sensors and energy efficient lighting to upgrade inside lighting and reduce energy consumption.

## 5. New Office Buildings

Energy efficiency is a priority for the new office buildings being planned for the Capitol Complex. The design teams — Substance for the North Office Building and BNIM for the IUB/OCA Building — have been charged with the following design goals relating to energy efficiency:

- Proper building orientation
- Maximum use of natural daylighting and energy saving lighting control devices
- Energy efficient building envelope
- Energy saving equipment throughout, including control devices on heating, ventilating and air conditioning equipment
- For the IUB/OCA Building, maximum energy consumption in the range of 28 to 30,000 BTUs per square foot per year
- For the North Office Building, return on investment analysis to determine the minimum feasible level of energy consumption, and the potential for LEED Silver certification

The design teams are also considering the feasibility of the following design features:

- Ground source (geo-thermal) heating

# Energy Efficiency in Iowa State Government

- Underfloor air distribution systems
- LEED Platinum certification, while focusing primarily on the energy saving criteria of LEED

As part of the design process, and inherent in LEED certification, will be the implementation of programs to educate building users on energy saving strategies they can participate in.

## V. Reports

## VI. Contacts – Questions about Energy Efficiency

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